PHASE I

- Retrospective Analysis of Ambient and Emissions Data and Refinement of Study Hypotheses
  - Task 1: Review of Available Emissions Data
  - Task 2: Analysis of SCOS97-NARSTO Meteorological and 3-D Ozone Data
  - Task 3: Synthesis of Phase I Data Analysis and Preparation of Phase I Report

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PHASE II

- Summer 2000 Field Measurements Program
  - Task 4: Update and Improve Temporally and Spatially Resolved Activity Factors
  - Task 5: Data Compilation and Validation of PAMS VOC and Upper-air Meteorological Data

PHASE III

- Data Analysis and Final Report
  - Task 6: Analysis of PAMS Upper-Air Meteorological Data
  - Task 7: Analysis of Activity Data
  - Task 8: Evaluation of SCOS97 Model Sensitivity Results
  - Task 9: Synthesis of Results and Final Report

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Task 1: Review of Available Emissions Data

- Identify VOC and NO_x sources which may differ on weekends versus weekdays
- Summarize diurnal variations in daily ROG and NO_x emissions by day-of-week for these sources
- Review the method(s) used to determine temporal variations and evaluate uncertainties
- Identify alternative methods or additional data available to update and improve existing temporal allocation of ROG and NO_x emissions

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Task 2: Analysis of SCOS97-NARSTO Meteorological and 3-D Ozone Data

- Evaluate meteorological conditions during SCOS97-NARSTO IOPs to determine applicability of each weekend IOP for assessments of the weekend effect
- For applicable weekend IOPs, characterize the surface and aloft spatial and temporal patterns of ozone and ozone precursors
- Analyze the data from the SCOS97 upper-air met network and evaluate the regional representativeness of the temporal and spatial variations in wind and mixing heights that can be obtained from the two PAMS profilers (at LAX and Ontario) alone

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Task 3: Synthesis of Phase I Data Analysis and Preparation of Phase I Report

- Summarize results of Phase I data analysis
- Update hypotheses
- Revise conceptual model
- Finalize field measurement program

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Task 4: Update and Improve Temporally and Spatially Resolved Activity Factors

- Gather and compile existing information and new data that will support weekend-weekday comparisons of emissions as determined in the plan developed in Phase I

Task 5: Data Compilation and Validation

- Compile and validate the following data collected during the ozone seasons of 1999 and 2000:
  - SCAQMD's PAMS VOC data
  - NO_x, CO, and ozone data
  - Upper-air meteorological data

Task 6: Analysis of PAMS Upper-Air Meteorological Data

- Objective: Determine applicability of each weekend exceedance for assessments of the weekend effect
- Approach: Use available meteorological data, including upper-air data from LAX and Ontario, to evaluate meteorological conditions and mixing heights during the weekend exceedances

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Task 7: Analysis of Activity Data

- Objective: Test hypotheses that may explain differences in weekday-weekend ozone levels in the SoCAB
- Approach: Use emissions-related activity data compiled during the first two phases to perform statistical analyses of differences between emissions-related activity patterns on weekdays and weekends

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Task 8: Evaluation of SCOS97 Model Sensitivity Results

- Evaluate modeling results to see if they are consistent with the results of other analyses.
- Review and select a base case for SoCAB modeling from the CRC-sponsored weekday/weekend modeling to be performed using SCOS97 data or from modeling performed by the ARB or the SCAQMD.
- Evaluate the results for consistency (or inconsistency) with the results from other analysis methods.

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Hypotheses to be Tested (1 of 4)

- A number of changes in emissions by day-of-week, time-of-day, and location in the SoCAB can be postulated.

Emission Source	Spatial Pattern	Diurnal Pattern	Daily Total Emissions
All Sources	Spread out	Spread out	Lower
Stationary Sources	Lower in CBD	Spread out	Mixed
Area-wide Sources	Higher in suburbs	Higher in afternoon	Higher
On-Road Mobile	Spread out	Spread out	Lower
Gasoline Vehicles	Higher in Suburbs	Lower in AM	Lower
Diesel Vehicles	Lower in CBD	Spread out	Lower
Other Mobile	Spread out	Spread out	Mixed
Industrial	Lower in CBD	Spread out	Lower
Recreational	Higher in Suburbs	Higher in afternoon	Higher
Misc. (Trains & planes etc.)	Lower in CBD	Spread out	Lower

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Hypotheses to be Tested (2 of 4)

- Specific emissions changes on weekends may include the following:
  - Increased refueling of gasoline-fueled vehicles (including Friday)
  - Decreased number of trips by gasoline-fueled vehicles
  - Increased home-related activities(e.g., use of lawn and garden equipment, surface coatings, paints, backyard barbecues, etc.)
  - Decreased commercial-related activities (e.g., use of lawn and garden equipment, surface coatings, paints, etc.)

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Hypotheses to be Tested (3 of 4)

- Specific emissions changes on weekends may include the following (concluded):
  - Increased recreational activities (boating and other off-road mobile sources)
  - Decreased industrial activity
  - Decreased diesel (truck, bus, and train) activity
  - Decreased commuter activity (work shift times and locations of on-road mobile source emissions)
  - Increased use of utility vehicles for personal use
  - Decreased trip chaining

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Hypotheses to be Tested (4 of 4)

Emissions Change	Location	Timing	Source Changes	Test Method(s)
ROG/NO_x higher	CBD	AM	Lower NO_x (diesel vehicles and industry)	Activity Survey Ambient Data in CBD
NO_x lower	CBD	All day	Decreased activity (stationary and mobile)	Activity Survey Ambient Data in CBD
ROG higher	Suburbs	PM	Increased activity (area-wide and mobile)	Activity Survey Ambient Data in suburbs
ROG reactivity	Suburbs	PM	Decrease in industrial solvent use	Activity Survey Ambient Data in CBD

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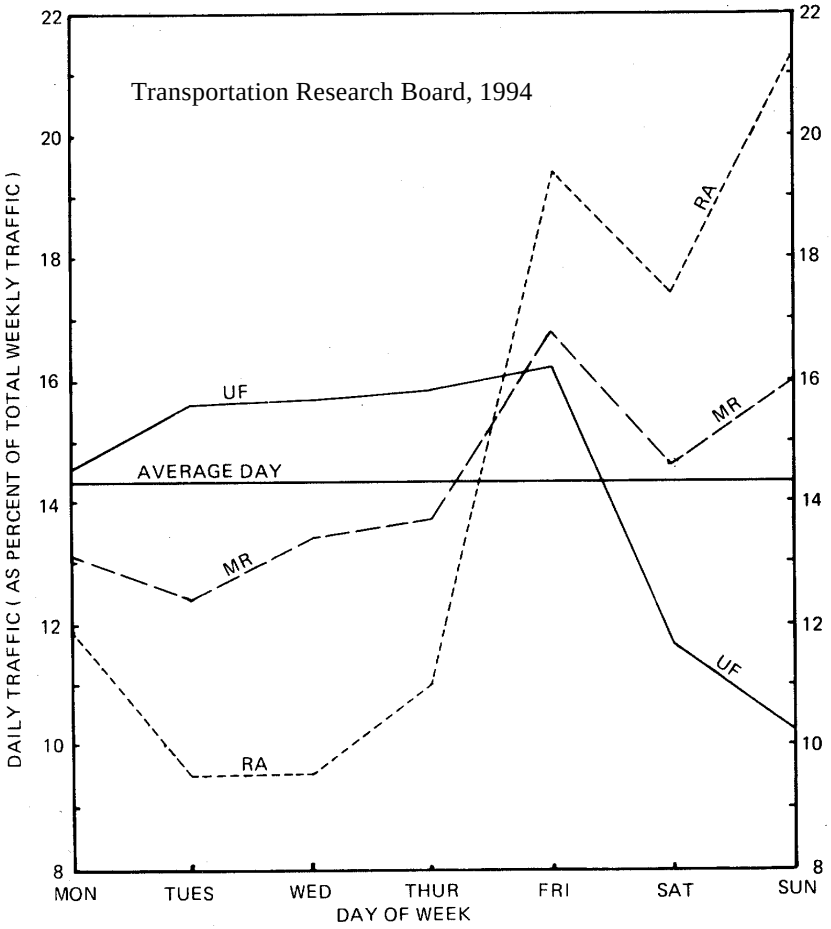
Examples of Daily Traffic Variation by Route Type



- MR curve represents main rural route I-35, Southern Minnesota, AADT 10,823, 4 lanes, 1980
- RA curve represents recreational access route MN 169, North-Central Lake Region, AADT 3,863, 2 lanes, 1981
- UF curve represents urban freeway, four freeways in Minneapolis-St. Paul, AADTs 75,000-130,000, 6-8 lanes, 1982

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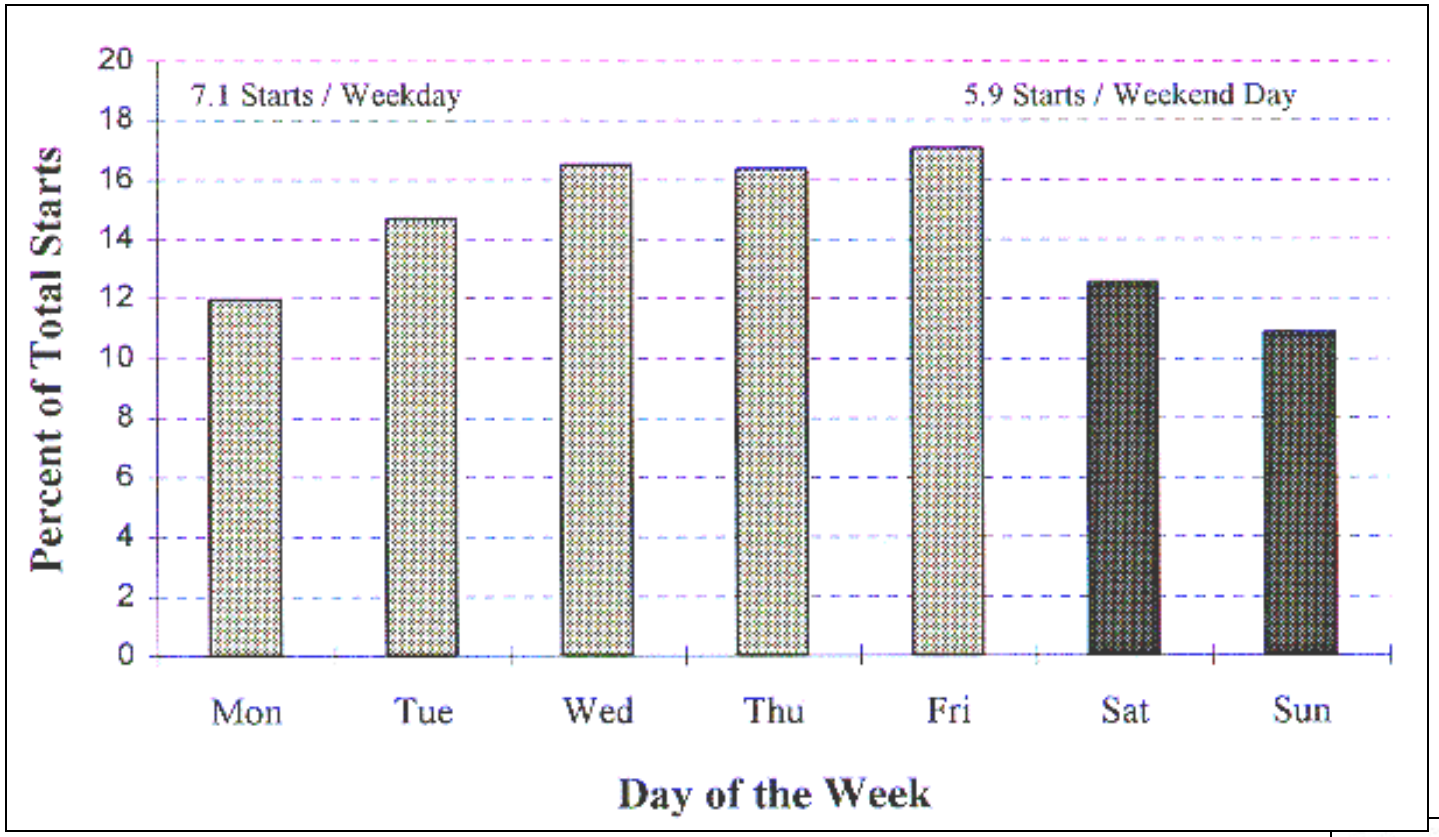
Frequency of Cold Engine Starts



1993-1995 study of instrumented vehicles in Los Angeles (Magbuhat and Long, 1996)

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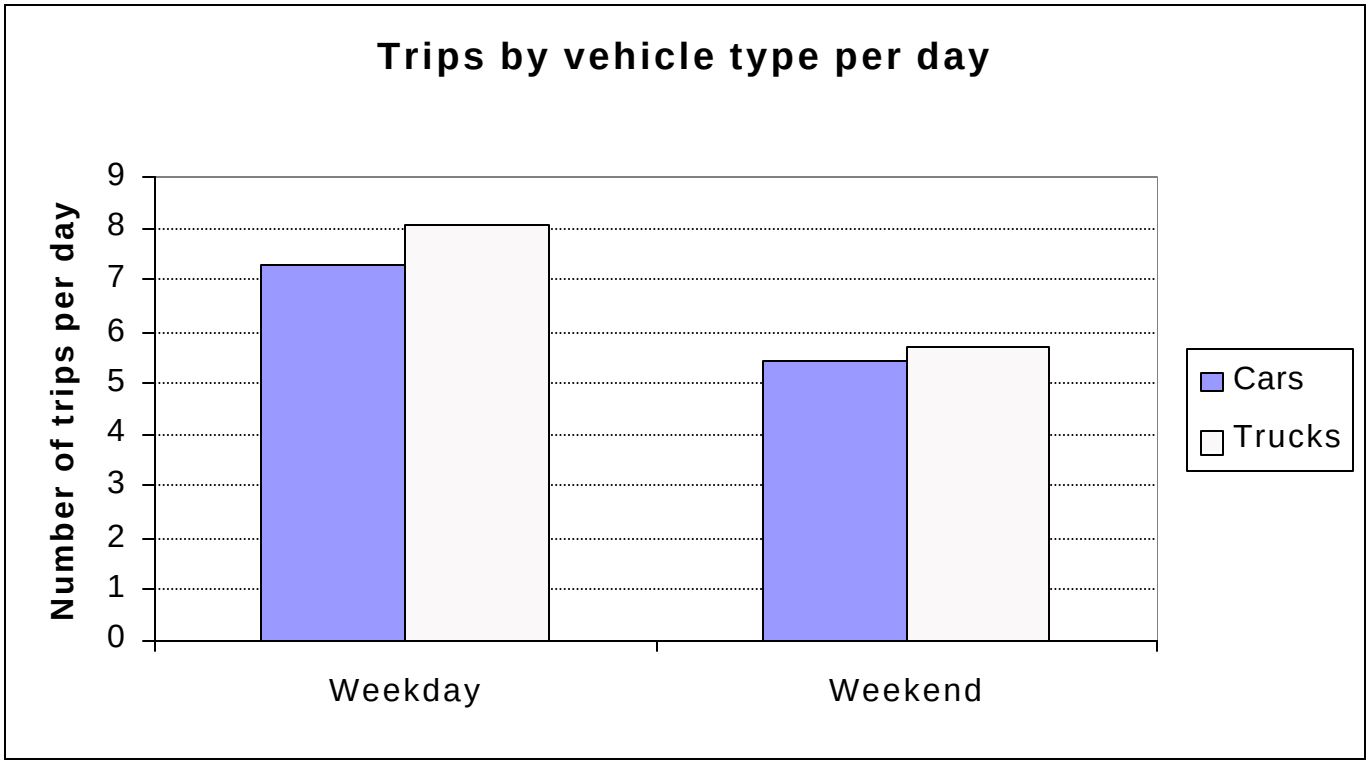
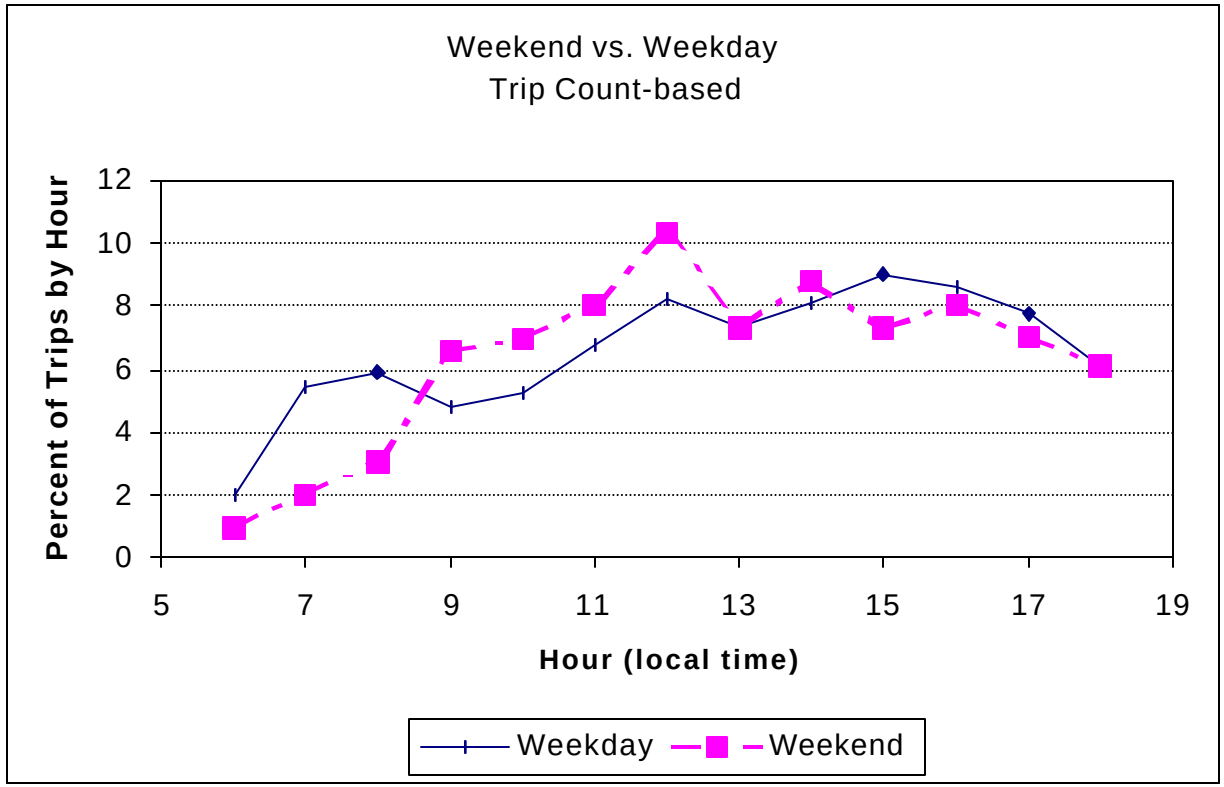
Average Weekend and Weekday Trip Frequencies



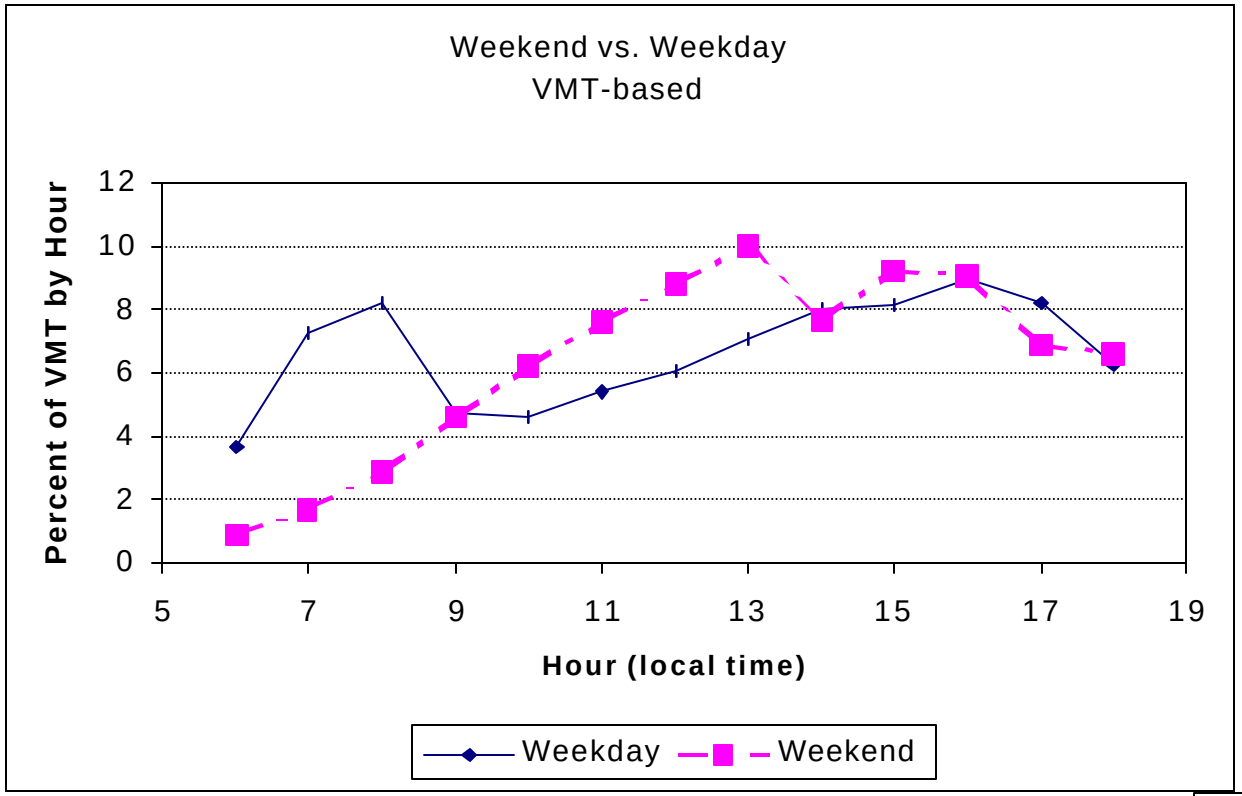
Glover and Brzezinski, 1998

Diurnal WE/WD Distributions of Trip Frequencies



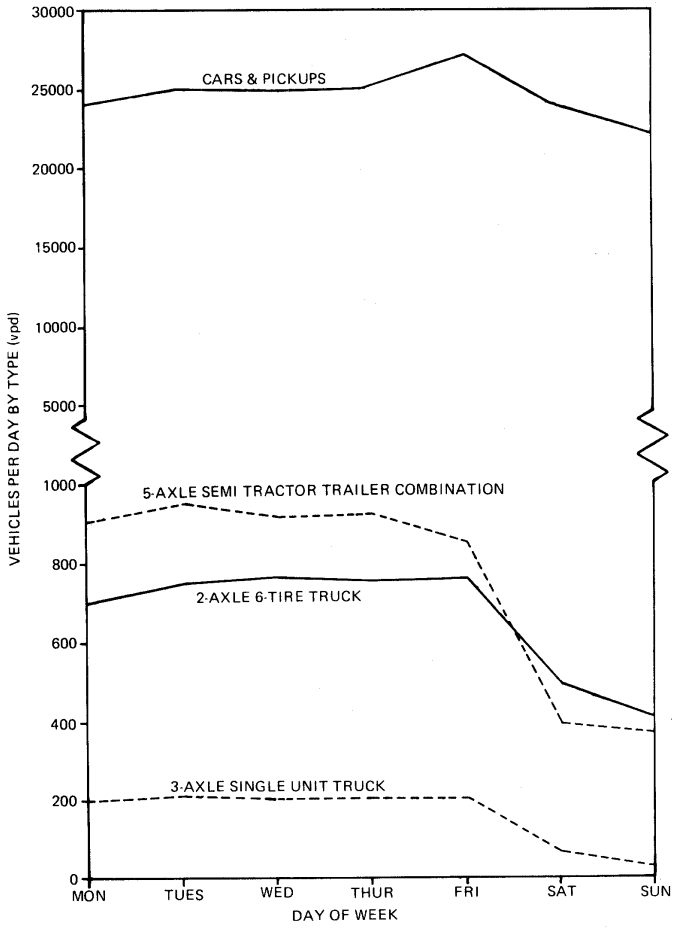
Glover and Brzezinski, 1998

Diurnal WE/WD Distributions of VMT



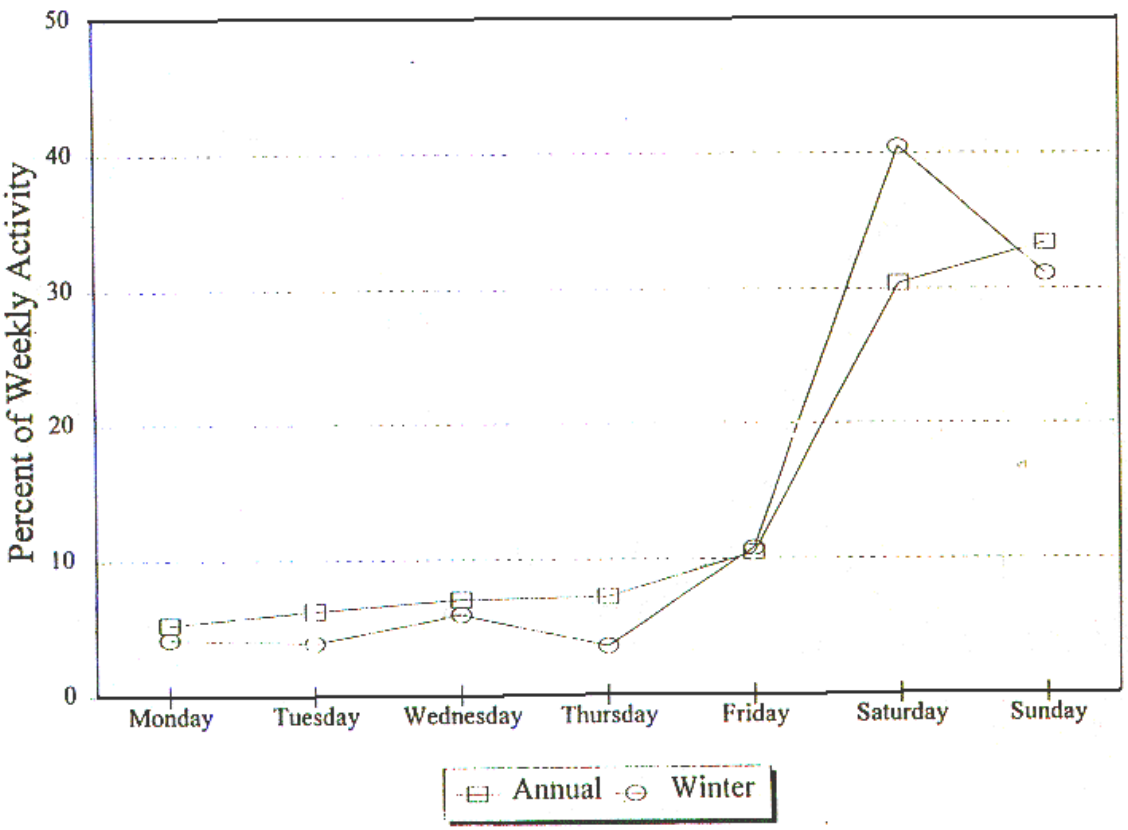
Glover and Brzezinski, 1998

Daily Variation in Traffic by Vehicle Type



Data collected on I-494, 4 lanes,
Minneapolis-St. Paul
Transportation Research Board, 1994

Estimated Daily Variation in Recreational Boating Activity



Based on fuel sales in California ARB, 1995

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